Appendix B - Emission Calculations

Data:
Standard Conditions: 29.92 inches Hg and 68 degrees Fahrenheit
Max Fuel Flow Rate = 22,206 lbs/hour (occurs during operating condition 100, Temp = 32 F)
Emission Factor (lbs/MMscf) = (controlled or uncontrolled ppmdv)*(MW)*(1/SMV)*(20.9/5.9)*(Fd)*(FHC)
where,
uncontrolled ppmdv = concentration at catalyst inlet corrected to 15% O2
controlled ppmdv = (BACT) required concentration corrected to 15% O2
MW = molecular weight (lbs/lb-mole)
SMV = specific molar volume at 68 degrees Fahrenheit = 385.3 dscf/lb-mole
Fd = dry oxygen F-factor for natural gas = 8,710 dscf/MMbtu at 68 degrees Fahrenheit
FHC = fuel heat content (natural gas) = 1,050 btu/dscf
Emission Rate Uncontrolled = Emission Factor Uncontrolled (lbs/MMscf) * Fuel flow rate (MMscf/hr)
Emission Rate Controlled = Emission Factor Controlled (lbs/MMscf) * Fuel flow rate (MMscf/hr)

Assumption:
PUC quality natural gas average specific gravity = 0.586 = 0.045 lbs/scf

CO Emissions (Normal Operations)

Operating Condition Number	Fuel Flow Rate (MMscf/hr)	Fuel Heat Content	Pollutant Conc. Uncontrolled (ppmdv)	Pollutant Conc. Controlled (ppmdv)	Molecular Weight	Specific Molar Volume	Dry Fuel Factor	Emission Factor Uncontrolled (lbs/MMscf)	Emission Factor Controlled (lbs/MMscf)	Emission Rate Uncontrolled (lbs/hr)	Emission Rate Controlled (lbs/hr)
100	0.4935	1,050	51	6	28	385.3	8,710	120.1	14.1	59.3	7.0
101	0.4546	1,050	27	6	28	385.3	8,710	63.6	14.1	28.9	6.4
102	0.4621	1,050	27	6	28	385.3	8,710	63.6	14.1	29.4	6.5
103	0.3388	1,050	14.5	6	28	385.3	8,710	34.1	14.1	11.6	4.8
104	0.4226	1,050	15	6	28	385.3	8,710	35.3	14.1	14.9	6.0
Average										**28.8**	**6.1**

NOx Emissions (Normal Operations)

Operating Condition Number	Fuel Flow Rate (MMscf/hr)	Fuel Heat Content	Pollutant Conc. Uncontrolled (ppmdv)	Pollutant Conc. Controlled (ppmdv)	Molecular Weight	Specific Molar Volume	Dry Fuel Factor	Emission Factor Uncontrolled (lbs/MMscf)	Emission Factor Controlled (lbs/MMscf)	Emission Rate Uncontrolled (lbs/hr)	Emission Rate Controlled (lbs/hr)
100	0.4935	1,050	25	5	46	385.3	8,710	96.7	19.3	47.7	9.5
101	0.4546	1,050	25	5	46	385.3	8,710	96.7	19.3	44.0	8.8
102	0.4621	1,050	25	5	46	385.3	8,710	96.7	19.3	44.7	8.9
103	0.3388	1,050	25	5	46	385.3	8,710	96.7	19.3	32.8	6.6
104	0.4226	1,050	25	5	46	385.3	8,710	96.7	19.3	40.9	8.2
Average										**42.0**	**8.4**

VOC Emissions (Normal Operations)

Operating Condition Number	Fuel Flow Rate (MMscf/hr)	AP-42 Fuel Heat Content	AP-42 Emission Factor (lbs/MMbtu)	Pollutant Conc. Controlled (ppmdv)	Emission Rate Uncontrolled (lbs/hr)			Emission Rate Controlled[1] (lbs/hr)
100	0.4935	1,020	0.0021	0.6	1.1			0.3
101	0.4546	1,020	0.0021	0.2	1.0			0.1
102	0.4621	1,020	0.0021	0.2	1.0			0.1
103	0.3388	1,020	0.0021	0.3	0.7			0.1
104	0.4226	1,020	0.0021	0.2	0.9			0.1
Average					**0.9**			**0.14**

[1] manufacturer's guarantee

PM10 Emissions (Normal Operations)

Operating Condition Number	Fuel Flow Rate (MMscf/hr)	AP-42 Fuel Heat Content	AP-42 Emission Factor (lbs/MMbtu)	Emission Rate Uncontrolled (lbs/hr)	Emission Rate Controlled (lbs/hr)			
100	0.4935	1,020	0.0066	3.3	3.3			
101	0.4546	1,020	0.0066	3.1	3.1			
102	0.4621	1,020	0.0066	3.1	3.1			
103	0.3388	1,020	0.0066	2.3	2.3			
104	0.4226	1,020	0.0066	2.8	2.8			
Average				**2.9**	**2.9**			

SOx Emissions (Normal Operations)

Operating Condition Number	Fuel Flow Rate (MMscf/hr)		SOx Emission Factor (lbs/MMscf)	Emission Rate Uncontrolled (lbs/hr)	Emission Rate Controlled (lbs/hr)			
100	0.4935		1.43	0.71	0.71			
101	0.4546		1.43	0.65	0.65			
102	0.4621		1.43	0.66	0.66			
103	0.3388		1.43	0.48	0.48			
104	0.4226		1.43	0.60	0.60			
Average				**0.62**	**0.62**			

[1] emission factor based on 1 grain sulfur/100 scf

NH3 Emissions (Normal Operations)

Operating Condition Number	Fuel Flow Rate (MMscf/hr)	Fuel Heat Content	Pollutant Conc. Uncontrolled (ppmdv)	Pollutant Conc. Controlled (ppmdv)	Molecular Weight	Specific Molar Volume	Dry Fuel Factor		Emission Factor Controlled (lbs/MMscf)	Emission Rate Uncontrolled (lbs/hr)	Emission Rate Controlled (lbs/hr)
100	0.4935	1,050	0	5	17	385.3	8,710		7.1	0.0	3.5
101	0.4546	1,050	0	5	17	385.3	8,710		7.1	0.0	3.2
102	0.4621	1,050	0	5	17	385.3	8,710		7.1	0.0	3.3
103	0.3388	1,050	0	5	17	385.3	8,710		7.1	0.0	2.4
104	0.4226	1,050	0	5	17	385.3	8,710		7.1	0.0	3.0
Average											**3.1**